

1.	Title of the course	Biological Processes in Wastewater Engineering
2.	Course number	CE519L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To CE5202/8
6.	To be offered by	Department of Civil and Environmental Engineering
7.	To take effect from	July 2022
8.	Prerequisite	Nil
9.	Course Objective(s): The course describes the principles and applications of biological processes in wastewater treatment and outlines their design criteria. The course would help the students to build a solid foundation on low-cost and conventional treatment technologies employed in treatment of wastewater. The students will also be exposed to the current advancement in the biological treatment of wastewater.	
10.	Course Content: Overview of wastewater sources, nature, and their characteristics; Fundamentals of mass balance and reaction kinetics; Reactor Analysis; Various reactor configurations; Wastewater treatment processes: Process section; Primary; Secondary; Tertiary treatments; Suspended growth processes: Growth kinetics; Modelling of suspended growth systems; Activated sludge process; Ponds; Lagoons. Biological nitrification and denitrification; Fundamentals of aeration process in wastewater treatment; Design of aeration systems; Attached growth processes: Trickling filters; Rotating biological contactors, Bio-towers; Anaerobic processes: Process fundamentals; Standard, high rate, and hybrid reactors; Expanded/fluidized bed reactors; Expanded granular bed reactors; UASB; Two stage anaerobic reactors; Anaerobic digestion; Wastewater reclamation and reuse; Effluent disposal	
11.	Textbook(s): 1. Qasim S R, Wastewater treatment plants planning, design and operation, CRC Press, New York (1999). 2. Metcalf and Eddy Inc, Tchobanoglous G, Burton F, and Stensel H D, <i>Wastewater engineering – treatment and reuse</i> , Tata-McGraw Hill, New Delhi (2009).	
12.	Reference(s): 1. Van Haandel A C and Lettinga G, Anaerobic sewage treatment, John Wiley and Sons, Chichester (1994). 2. Peavy H S, Rowe D R and Tchobanoglous G, Environmental Engineering, McGraw Hill (1985). 3. Grady, Jr. C P L and Lim H C, <i>Biological wastewater treatment: Theory and applications</i> , Marcel Dekker, Inc., New York (1999).	